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## **CLAIMS**

The following is claimed:

1	1.	A method for determining the presence of biomolecules using a surface-
2		enhanced Raman spectroscopy (SERS) system, comprising:
3		providing a first target biomolecule, a first target nanoparticle, and a
4	,	first detector nanoparticle;
5		forming a first detector complex electrochemically on a conductive
6		substrate, wherein the first detector complex includes the first target
7		biomolecule, the first target nanoparticle, and the first detector nanoparticle,
8		wherein the first detector nanoparticle is disposed on the first target
9		nanoparticle, wherein the first target nanoparticle is disposed on the first target
10		biomolecule, and wherein the first target biomolecule is disposed on the
11		conductive substrate;
12		directing a laser at the first detector complex, wherein the interaction of
13		the laser with the first detector complex produces a SERS signal specific for
14		the first target biomolecule; and
15		detecting the SERS signal.
1	2.	The method of claim 1, wherein forming a first detector complex
2		electrochemically, comprises:
3		forming a first target complex that includes the first target biomolecule
4		and the first target nanoparticle; and
5		disposing the first target complex onto the first conductive substrate.

1	3.	The method of claim 1, wherein forming a first detector complex
2	electi	rochemically, comprises:
3		disposing the first target biomolecule onto the first conductive
4		substrate;
5		contacting the first target nanoparticle with the first target biomolecule;
6		and
7		forming a first target complex on the first conductive substrate,
8		wherein the first target complex includes the first target biomolecule and the
9		first target nanoparticle.
1	4.	The method of claim 1, wherein the first target nanoparticle includes a gold
2		nanoparticle.
1	5.	The method of claim 1, wherein the first detector nanoparticle includes a silver
2		nanoparticle.
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1	6.	The method of claim 1, wherein forming a first detector complex, comprises:
2		applying a voltage to the first conductive support.
1	7.	The method of claim 1, wherein forming a first detector complex comprises:
2 .		contacting the first conductive substrate to a foreign conductive
3		structure to cause the reduction of the first detector nanoparticles onto the first
4		target nanoparticle.

1	8.	The method of claim 1, wherein a first marker molecule is attached to the first
2		target biomolecule.
1	9.	The method of claim 1, wherein a first marker molecule is attached to the first
2		target nanoparticle.
1	10.	A method for determining the presence of biomolecules using a surface-
2		enhanced Raman spectroscopy (SERS) system, comprising:
3		providing a first target biomolecule;
4		providing a first target nanoparticle;
5		forming a first target complex that includes the first target nanoparticle
6		and the first target biomolecule disposed on a first conductive substrate;
7		providing a solution of first detector nanoparticles;
8		causing the first target complex to contact the solution of first detector
9		nanoparticles;
10		catalyzing the deposition of the first detector nanoparticles on the first
11		target complex;
12		forming a first detector complex that includes the first detector
13		nanoparticle disposed on the first target complex;
14		directing a laser at the first detector complex, wherein the interaction of
15		the laser with first detector complex produces a SERS signal specific for the
16		first target biomolecule; and
17		detecting the SERS signal.

1	11.	The memod of claim to, wherein catalyzing comprises.
2		applying a voltage to the first conductive support.
1	12.	The method of claim 11, wherein the voltage is applied using a potentiostat.
1	13.	The method of claim 10, wherein catalyzing comprises:
2		contacting the first conductive substrate to a foreign conductive
3		structure to cause the reduction of the first detector nanoparticles onto the first
4		target nanostructures.
1	14.	The method of claim 10, wherein forming a first target complex comprises:
2		forming the first target complex prior to being disposed on the first
3		conductive substrate.
1	15.	The method of claim 10, wherein forming a first target complex comprises:
2		forming the first target complex by contacting the first target
3		nanoparticle with the first target biomolecule that is disposed on the first
4		conductive substrate.

1	10.	A biosensor system for determining the presence of biomolecules, comprising
2		a first target complex disposed on a first conductive substrate, wherein
3		the first target complex includes a first target biomolecule and a first target
4		nanoparticle, and wherein the first target nanoparticle is disposed on the first
5		target biomolecule;
6		a first detector nanoparticle disposed on the first target nanoparticle,
7		wherein the first detector nanoparticle is electrochemically deposited on the
8		first target nanoparticle; and
9		a SERS system capable of detecting a SERS signal specific for the firs
0		target biomolecule.
1	17.	The system of claim 17, wherein the first target nanoparticle includes a gold
2		nanoparticle.
1	18.	The system of claim 17, wherein the first detector nanoparticle includes a
2		silver nanoparticle.
1	19.	The system of claim 17, wherein the SERS system includes a laser system.
1	20.	The system of claim 17, wherein the first target nanoparticle includes a
2		nanoparticle in the size range of about 1 nanometer and about 1000
3		nanometers

1	21.	The system of claim 17, wherein the first detector nanoparticle includes a
2		nanoparticle in the size range of about 1 nanometer and about 1000
3		nanometers.
1	22.	The system of claim 17, further comprising a potentiostat capable of causing
2		the first detector nanoparticle to deposit on the first conductive substrate by
3		applying a voltage between about 100 and about 1500 millivolts (versus
4		silver/silver chloride reference electrode) to the first conductive support.
1	23.	The system of claim 17, further comprising:
2		a second target complex disposed on the first conductive substrate,
3		wherein the second target complex includes a second target biomolecule and a
4		second target nanoparticle, and wherein the second nanoparticle is disposed on
5		the second biomolecule, and
6		a second detector nanoparticle disposed on the second target
7		nanoparticle, wherein the second detector nanoparticle is electrochemically
8		deposited on the second target nanoparticle; and
9		wherein the SERS system is capable of detecting a SERS signal
10		specific for the second target biomolecule.
1	24.	The system of claim 17, wherein the first conductive substrate is in a
2		microfluidic chip.
1	25	The system of claim 17, wherein the first conductive substrate is on the tip of

an optical fiber.

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